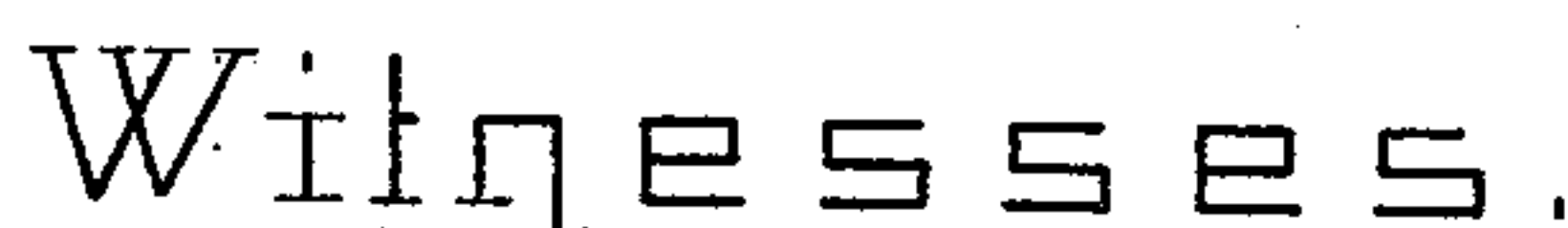


2 Sheets—Sheet 1.

No. 272,735.

Patented Feb. 20, 1883.



Inventors.

Gordon McKay and John C. Hoadley
by Crosby Sturgis attys

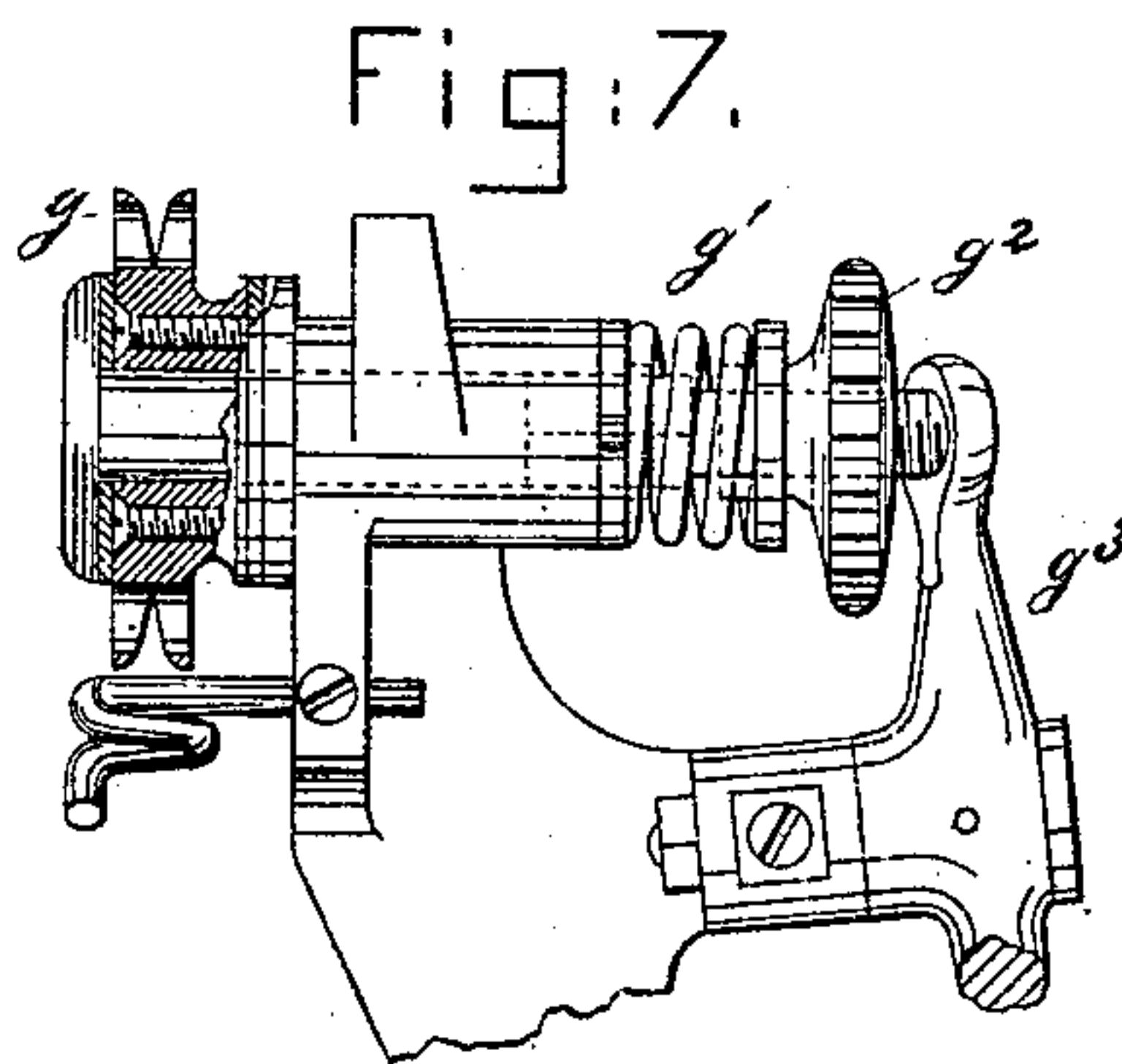
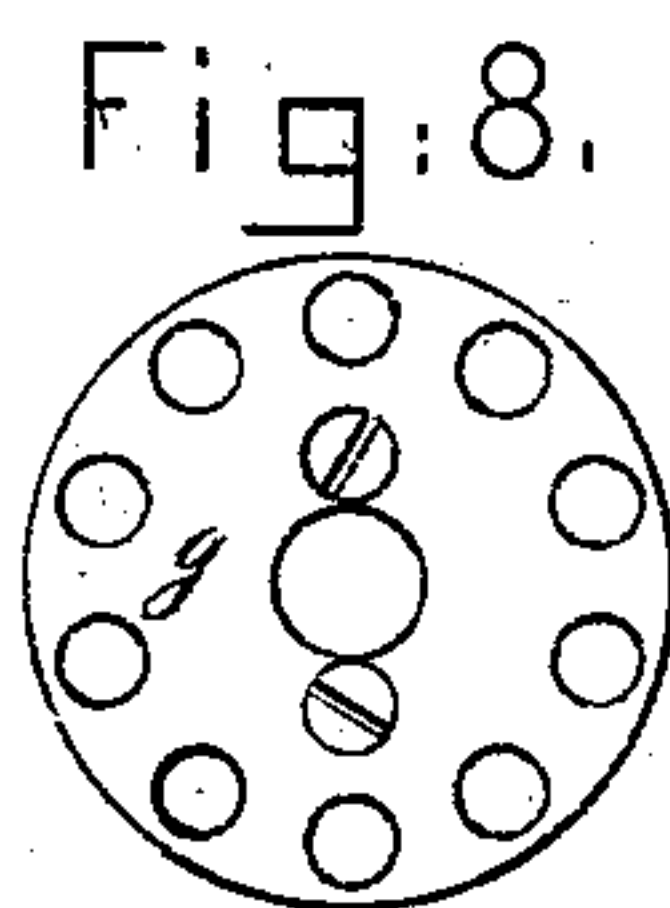
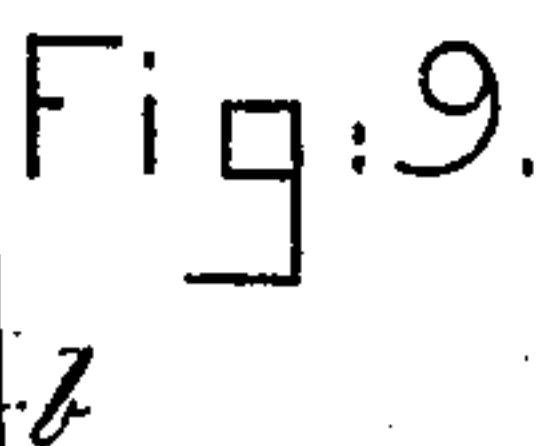
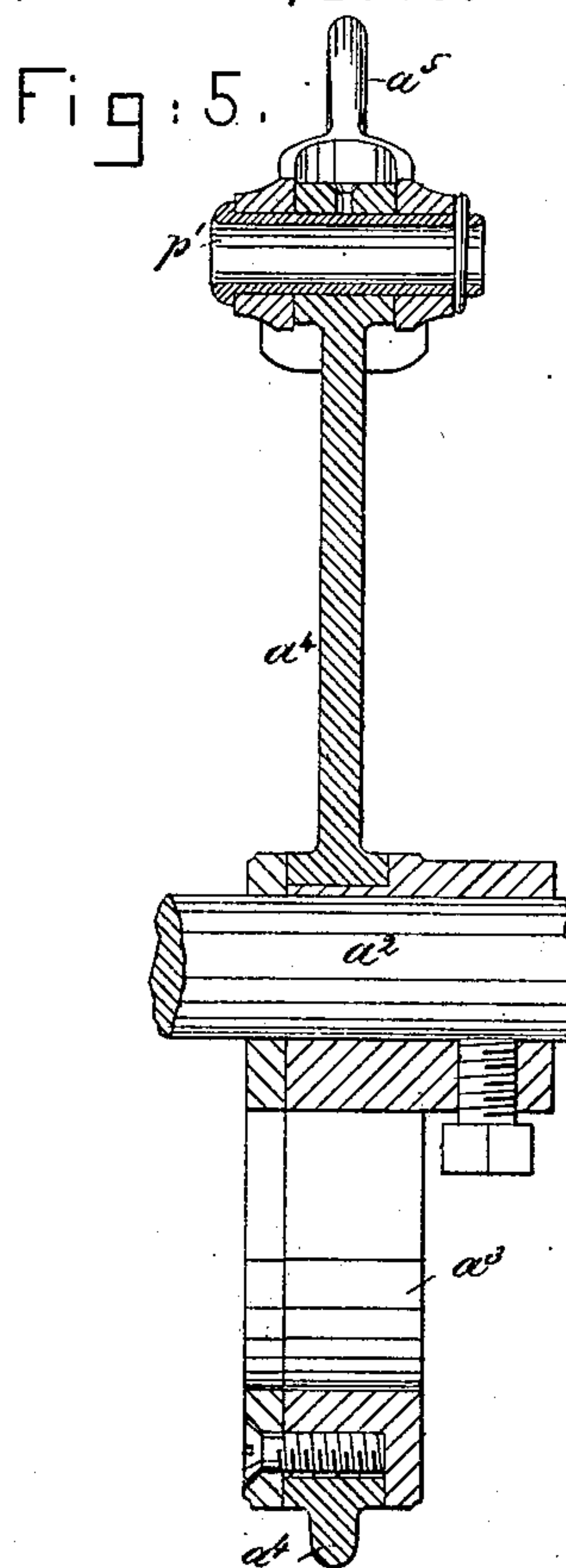
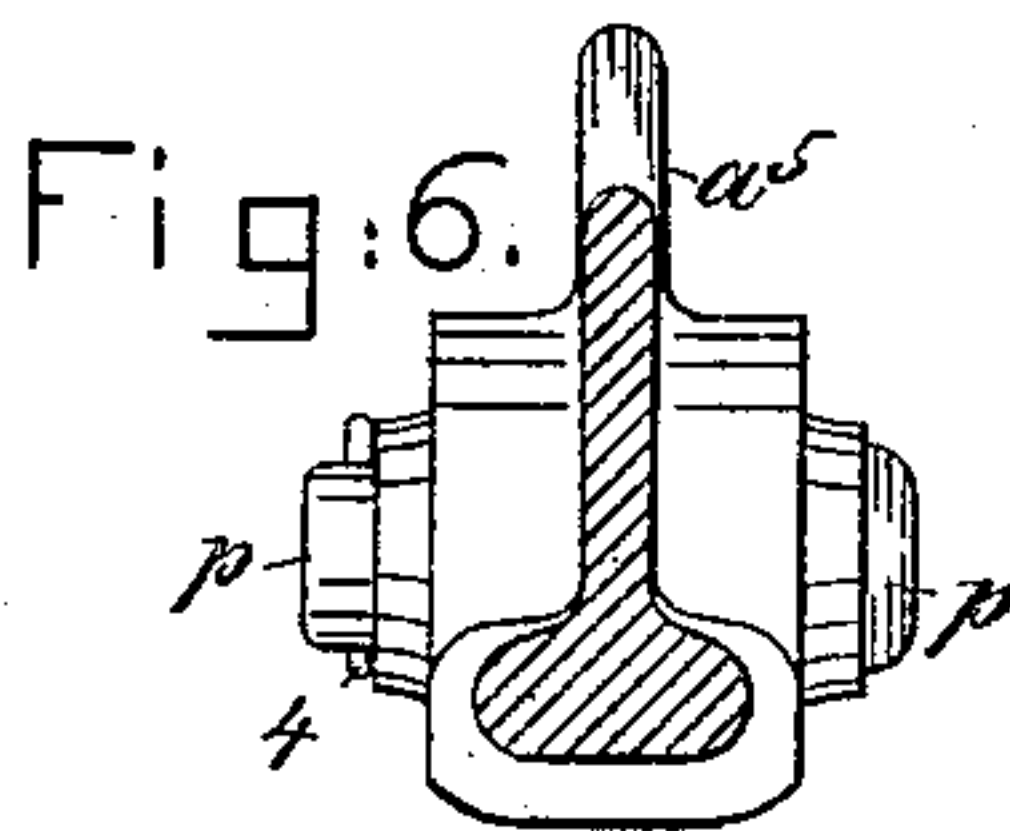
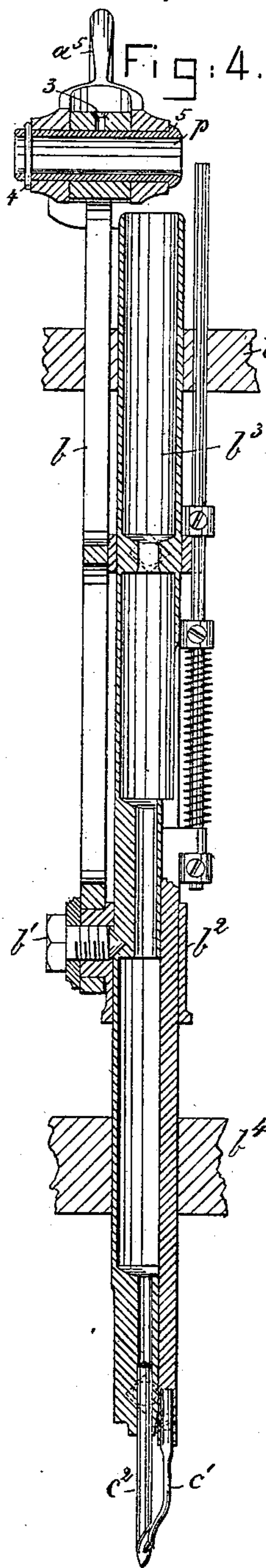
(No Model.)

2 Sheets—Sheet 2.

G. McKAY & J. C. HOADLEY.
SOLE SEWING MACHINE.

No. 272,735.

Patented Feb. 20, 1883.



Witnesses.
Fred A. Powell.
John F. C. Pimblet.

Inventors.
Gordon McKay and John C. Hoadley
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UNITED STATES PATENT OFFICE.

GORDON MCKAY, OF NEWPORT, R. I., AND JOHN C. HOADLEY, OF BOSTON, MASS.; SAID HOADLEY ASSIGNOR TO SAID MCKAY.

SOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 272,735, dated February 20, 1883.

Application filed November 23, 1882. (No model.)

To all whom it may concern:

Be it known that we, GORDON MCKAY, of Newport, county of Newport, and State of Rhode Island, and JOHN C. HOADLEY, of Boston, Massachusetts, have invented an Improvement in Sole-Sewing Machines, of which the following description, in connection with the accompanying drawings, is a specification.

Our invention has for its object to increase the speed of sole-sewing machines beyond that at which they are now run, and thus enable them to perform more work, and this we have been enabled to accomplish without detriment to the sewing.

In this our invention, to insure uniformity of stitch and avoid jerking the thread and turning a spool, which causes great variation in tension, we have shown the thread-holder as a stationary bobbin arranged to deliver its thread from its end. To enable the speed of the needle-bar to be increased to the highest practical limit of speed at which it can be run and an operator take proper care of the work, we had to decrease the weight of the needle-bar and its operative parts, and reduce the strain on the said parts which arises from momentum, and this we have provided for by making the needle-bar hollow and reducing the weight of parts, as will be hereinafter described. Having arranged to run the needle-bar-actuating mechanism at its increased and greatest practical speed, we arranged mechanism to operate the whirl at a relative speed twice faster than that of the needle-bar. The whirl, rotated continuously without jar, is always in time to operate in unison with and supply the hooked needle with thread while it is below the material and the supporting-surface of the horn, and while the needle is temporarily at rest at the end of its downstroke.

Our invention consists in an organized sole-sewing machine containing a hollow needle-bar, a hooked needle, means to operate the needle-bar and cause it to dwell at its downstroke, a horn, a thread-carrying whirl therein, and means to rotate it twice to each complete rise and fall of the needle-bar, a stationary bobbin or cop to deliver the thread from its end, and a tension device to act upon the said thread between the bobbin or cop and

whirl, and maintain it at uniform tension irrespective of decreasing size of the bobbin, also in details of mechanism, as will be hereinafter described.

Figure 1 represents in front elevation and partial section a sufficient portion of a sole-sewing machine to illustrate our invention; Fig. 2, a side elevation with the frame-work partially broken away; Fig. 3, a detail of the end of the horn and whirl; Fig. 4, an enlarged sectional detail of the hollow needle-bar, needle, and cast-off, and walking-beam, and connected link; Fig. 5, a sectional detail of the eccentric and link to move the walking-beam; Fig. 6, a cross-section of the walking-beam in the line $x x$, Fig. 2; Fig. 7, a partial top view and section of the tension device; Fig. 8, a side view of the tension-wheel, and Fig. 9 a side view of the needle-bar link.

The frame-work A, of usual shape, has a main shaft, a^2 , provided with a hollow eccentric, a^3 , which receives the strap of an eccentric-link, a^4 , which is connected to the rear end of a walking-beam or needle-bar-actuating lever, a^5 , having its fulcrum on the rising and falling rod a^6 , substantially as in United States Patent No. 45,422. The walking-beam is made T-shaped in cross-section, as in Fig. 6, to secure greatest strength in proportion to the weight of metal. The forward end of lever a^5 is provided with a skeleton link, b , (shown separately in Fig. 9,) attached at its lower end by a screw or pin, b' , (see Fig. 4,) to a collar, b^2 , secured to the hollow needle-bar b^3 by the same screw. The upper end of the skeleton link is connected with the forked end of the walking-beam a^5 by a tubular or hollow steel pin, p , preferably confined to the said beam by a screw, 3, and a cross-pin, 4, the hollow pin having at one end a head, 5, as in Fig. 4. The link a^4 is connected with the rear end of the needle-bar by a like hollow pin, p' . Heretofore the links referred to have been joined with the walking-beam by solid pins. The hollow pin and link act to very considerably reduce the strain arising from momentum. The needle-bar b^3 has its lower guide in the pillar-plate b^4 and its upper guide in the top plate, b^5 , the said top plate having attached to it an adjustable friction device, C, such as described in United States

Patent No. 45,422, to act upon and retard the needle-bar at the end of its up and down strokes, as is well understood.

The cast-off c' and its operative mechanism 5 are and may be the same as in the patent referred to.

The needle-bar and hooked needle c^2 , attached to it, have a short period of rest or dwell at the end of each descent, just at the 10 time that the whirl c^3 (see Fig. 3) in its rotation acts to deliver its thread (taken from bobbin 8) to the hook of the needle, the whirl, to do this effectually, having nearly a complete revolution while the hook of the needle is below the stock and the surface or top of the 15 work-supporting horn c^4 , which latter is constructed, as usual, to be rotated.

The needle-bar b^3 (see Fig. 4) is hollow and made of steel, so that it is very light, but yet 20 very strong, and, being of light weight, it is possible to start it quickly, move it rapidly, and stop it suddenly without liability of breaking the needle-bar and its moving parts, owing to great strain and momentum, as would be the 25 case were the needle-bar made as a solid piece of metal and of the diameter usually employed in sole-sewing machines as made prior to the one herein shown and described.

The main shaft a^2 has upon it a gear, d , 30 which engages a gear, d' , having but half as many teeth, on a short shaft, d^2 , provided with a bevel-gear, which in turn engages a bevel-gear, d^4 , on shaft d^5 , and, through the said shaft, gears d^6 d^7 , and shaft d^8 , drives gears d^9 d^{10} . The 35 bevel-gear which engages the bevel-gear d^4 and the gears d^6 d^7 and d^9 d^{10} are made in pairs, the teeth in each of the gears of each pair being equal in number. The gear e' at the top of the shaft e engages with a smaller gear, e^2 , on the 40 shaft e^3 . The pair of gears e' and e^2 are in the ratio of fourteen to six, which is the ratio existing between the number of teeth in the whirl c^3 and gear e' , which drives it, but in the converse direction, to thus reduce the speed 45 of the whirl relatively to the gear e' , which drives it, in the same proportion that the said gear was accelerated by the difference between the number of teeth of gears e' and e^2 . By 50 thus changing the size of the gear referred to it is possible to make the gear e' smaller than were the gears e' and e^2 of like size, and as it is very necessary to economize space in the end of the horn the change of size in gearing becomes important, and yet the change does 55 not affect the relative motion of the whirl and main shaft, but enables the whirl to perform exactly two revolutions to one of the said main shaft. The shaft e^3 has a bevel-gear, e^4 , which engages a bevel-gear, e^5 , of like diameter on 60 the shaft e^6 , which at its upper end has the bevel-gear e^7 , with six teeth, which engages the whirl having fourteen teeth. The whirl c^3 (see Fig. 3) is rotated continuously forward at a uniform speed derived from and depending upon the main shaft a^2 , and at a speed 65 relatively twice as fast as the speed of the shaft

which actuates the needle-bar and needle, so that the whirl rotates twice during each complete rise and fall of the needle-bar, one of the said rotations being in just the proper time to 70 lay the thread carried by the whirl into the hook of and about the needle, so that the said thread is taken unerringly. Two to one is the least possible variation in speed between the 75 needle and whirl which it is practicable to have and enable the whirl to be rotated continuously at a uniform speed while the needle is reciprocated at its highest practical speed. The waxed thread to be presented to the 80 hooked needle by the whirl at each second rotation of the latter, or while the needle-bar is at rest at its downstroke, will be taken from a bobbin or cop, 8, such as commonly used in 85 loom-shuttles, and the thread being taken from the end of the said bobbin or cop while at rest, enables the thread to reel off without the necessity of rotating the said bobbin or cop. The thread referred to will be led from the 90 bobbin 8 about the rotating whirl g of a thread-tension device controlled by a spring, g' , nut g^2 , and lever g^3 .

The tension device and bobbin referred to are substantially such as represented in United States Patent No. 229,049, to which reference may be had. 95

We do not herein claim as novel and of our joint invention any one of the especial devices herein shown and described; but the novel combination and arrangement of the various 100 parts and their reduction in weight, as described, enable us to so materially increase the practical speed of the machine that a much larger quantity of work may be done upon it in a given time and without breakage of parts or injuriously affecting the uniform good quality 105 of the work. The sewing done by this our rapidly-operating machine is equal in all particulars to that done on sole-sewing machines prior to this our invention, but operating at a speed very considerably slower than 110 the one herein described.

While we consider a whirl having two rotations to each complete up and down movement of the needle-bar as producing the most satisfactory results, it is obvious that the whirl 115 might have more than two rotations in the time specified without departing from our invention; but such increase of the speed of the whirl is not desirable, and would necessitate a slower movement of the needle-bar. 120

We claim—

1. The combination, in a sole-sewing machine, of a hollow needle-bar, hooked needle, means to operate the needle-bar and cause the 125 needle to dwell or rest at the end of the downstroke, the horn, the whirl, and means to rotate the same twice at each complete rise and fall of the needle-bar, a stationary bobbin or cop to hold the thread and obviate inequalities of delivery, owing to variations in the diameter of the bobbin, and a tension device to 130 act upon the said thread between the bobbin

and whirl, all substantially as and for the purpose set forth.

5 2. The walking-beam or lever, hollow needle-bar and connecting link, and hollow pin, combined with the horn, its whirl, and means to move the same continuously in one direction twice during each complete stroke of the needle-bar, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GORDON MCKAY.
JOHN C. HOADLEY.

Witnesses:

G. W. GREGORY,
JOS. P. LIVERMORE.